

## Lecture questions

In this exercise you will answer questions related to this weeks lecture.

Note that you can submit the answer to each question only once. The questions are designed to be easy if you have followed the lecture. Note that the questions can vary slightly between students.

Points10 / 10

My submissions1 / 1

Deadline Friday, 31 March 2023, 19:00  
To be submitted alone

The deadline for the assignment has passed (Wednesday, 12 April 2023, 19:00).

Definition of graph

Question 110 / 10

How do you define a graph?

☒ **Graph is a mathematical abstraction of networks defined as  $G=(V,E)$ , where  $V$  is the set of vertices/node and  $E$  is a set of edges/links. Each edge in  $E$  is a pair of nodes  $(v,u)$ , which indicates that the two nodes are connected.**

☐ Graph is a mathematical abstraction of networks defined as  $G=(V,E)$ , where  $V$  is the set of vertices/node and  $E$  is a set of edges/links. The set of edges  $E$  is a subset of all nodes  $V$  indicating which of the nodes are in the edge of the graph.

☐ Graph is a mathematical abstraction of networks defined as  $G=(V,E)$ , where  $V$  is the set of vertices/node and  $E$  is a set of edges/links. The set of edges  $E$  is a set of nodes which are not in  $V$  indicating which of the nodes are in the edge of the graph.

Correct!

Submit

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Definition of hubs

Question 110 / 10

What is the definition of a hub in a graph?

☐ A hub in a graph is a node that connects multiple clusters or communities within the network, acting as a bridge between them.

☐ A hub in a graph is a node that has the highest betweenness centrality, indicating that it is the most central and important node in the network.

☒ **A hub in a graph is a node that has a high degree. Hubs are often effective connectors within the network and can get high centrality scores. A network can have multiple hubs.**

Correct!

Submit

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Homophily

Question 110 / 10

What is the concept of homophily in the context of social networks?

☐ Similar nodes attract each other in network visualization plots. This allows one to draw pictures of networks where nodes with same attributes are close to each others.

☒ **Homophily is the idea that individuals tend to form connections with others who are similar to them in terms of characteristics such as race, ethnicity, age, education, and other demographic factors. This can result in clusters or communities of similar individuals within a network.**

☐ Homophily is the idea that individuals tend to form connections with others who are more central or influential within a network. This can result in core-periphery structures in a network with a small number of highly connected individuals.

Correct!

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Centrality measures

Question 110 / 10

Which of these claims about centrality measures is INCORRECT?

☐ Degree centrality measures centrality simply by counting how many connections a node has. That is, the degree of a node is taken as a centrality measure.

☐ Betweenness centrality is a measure which tells what is the fraction of how many shortest paths go through a node. That is, high betweenness centrality nodes can be described as “bridges” connecting parts of networks to each other.

☒ **Closeness centrality measures how closed a neighborhood of a node is. That is, it measures the fraction closed two-stars, i.e. triangles, out of all two-stars around a node.**

☐ Eigenvector centralities work by a recursive definition of centrality: central nodes are close to other central nodes.

Correct!

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Strength of weak ties

Question 110 / 10

What is “the strength of weak ties” hypothesis that was introduced by Granovetter in his prominent article in 1973?

☒ **The strength of weak ties hypothesis states that strong ties are likely to be within groups, and are thus redundant and provide similar information and opportunities, whereas weak ties provide bridges to further-away parts of the social network. This means that individuals tend to receive more diverse information and have greater access to opportunities through their weak ties (i.e., acquaintances) rather than through their strong ties (i.e., close friends and family).**

☐ The strength of weak ties hypothesis states that the number of ties an individual has, regardless of whether they are strong or weak, is the most important factor in determining the diversity of information and opportunities they receive.

☐ The strength of weak ties hypothesis states that the quality of the relationships an individual has, regardless of whether they are strong or weak, is the most important factor in the stability of the connection.

☐ The strength of weak ties hypothesis states that weak connections are more robust to change in social networks. This means that weak connections (i.e., acquaintances) are more likely to remain stable (but weak), whereas strong ties (i.e., close friends and family) face more variation in the tie strength and become weak ties. This explains why there are more weak ties than strong ties in ego networks of individuals.

Correct!

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Mesoscale structure

Question 110 / 10

Which of the following claims is INCORRECT?

☐ A core-periphery structure refers to a network configuration where there is a dense core group of nodes that are strongly connected to each other and a periphery group of nodes that have very few connections to each other. That is, typically the most connections that periphery nodes have are to the core. The core is typically composed of highly central and influential individuals, whereas the periphery is composed of more peripheral and less influential individuals. This structure can have implications for the flow of information, resources, and power within the network.

☐ Community structure in social networks refers to the division of a network into groups of nodes that are more densely connected to within each group than to the rest of the network. These groups are called communities, and they can represent meaningful social or organizational entities. Community detection is the process of identifying communities in a network. This can be accomplished through various algorithmic techniques.

☒ **Network visualization techniques are methods for displaying the structure of networks. These techniques are reliable for uncovering patterns and relationships within network data, and are particularly useful for spotting networks with no structure: If a visualization shows an unstructured disk-shaped figure (a ‘hair ball’), then we know that the network is produced by a random network generation mechanism, which is know as a Bernoulli random graph.**

Correct!

Submit

« 5. Week: Social networks - structure

Course materials

5.2 Exercise: Structure of a reposting network »

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